

## **REMARKS**

As a preliminary matter, Applicants add new claims 72-75 to more completely claim the present invention. No new matter is added by the addition of new claims 72-75. Claim 71 is hereby cancelled.

The Examiner has rejected claims 42-44, 47, 48, 51-53, 56, 57, 60 and 61 under 35 U.S.C. §102(e) for anticipation by United States Patent No. 6,592,744 (Hodges *et al.*). Specifically, the Examiner asserts that Hodges *et al.* discloses a system for detecting the filling status of an electrochemical cell wherein a light source, such as a laser, is passed through the cell and changes in optical density (O.D.) are detected by an optical detector. The Examiner asserts that the light of Hodges *et al.* has a specific property (O.D.) when passing through the cell when filled with liquid and a different property (O.D.) when not passing through the cell with liquid as does the light beam of the claimed invention.

In response, nowhere does Hodges *et al.* describe the use of a refractive method for determining whether or not a liquid is present in the path of the light beam and/or when the electrochemical cell is filled or a physical embodiment of a device having those qualities. The Examiner's characterization of different O.D.'s and differential reflection as "different properties" is an improper and incorrect generalization. The method of detecting the presence of liquid in Hodges *et al.* is different from the method of the present application. Here, the claimed devices are clearly physically different from those of Hodges *et al.* As stated in MPEP (*Manual of Patent Examining Procedure*) §2131, anticipation requires that the identical invention must be shown in as complete detail as is contained in the claim. Here, Hodges *et al.* does not provide the detail related to differential refraction, as is claimed in the present application.

The claims of the present application recite an electrochemical cell that fails from loss of electrolyte. The cell of Hodges *et al.* never fails from loss of electrolyte and does not contain electrolyte in its normal, operative state. In the present application, the electrochemical cell "contains" electrolyte, which is understood to refer to a substantially closed system that gradually leaks or otherwise collects gas and not to a cell that is filled and emptied in the typical course of operation. Applicants hereby amend claims 42, 51, 60, 64 and 65 to clarify that the electrochemical cell is of the type that in its normal, operational state "contains" electrolyte. As discussed on page 6, lines 12-21 of the present application, "a typical cell of this sort is an electrochemical gas sensor, such as an oxygen sensor." As such, though Hodges *et al.* describes an electrochemical cell and the presence of liquid can be detected by optical density (O.D.) readings, differential refraction is not used to detect liquid in the cell, and the cell is not the same type of closed electrochemical cell as is claimed in independent claims 42, 51, 60, 64 and 65 of the present application.

Anticipation under 35 U.S.C. §102 requires either express or inherent disclosure in the prior art of what is claimed in the present application. In the present application, independent claims 42, 51, 60, 64, and 65 all require that a light beam detector is configured with respect to the electrochemical cell in a manner permitting differential refraction of the light beam when the cell is full, as compared to when an air pocket is present in the path of the light beam. The claims further require that the detector is situated with respect to the cell such that the differential refraction would be detected by the light beam detector. That is, to have the ability to refract differentially, the light beam cannot enter the liquid reservoir perpendicularly to the reservoir container, or no

refraction will occur. Lastly, the light path must be positioned in the cell to detect gas pocket formation prior to the failure of the cell. There is no such disclosure in Hodges *et al.* If anything, Hodges *et al.* discloses a light path that is perpendicular to the walls of the cell that will not refract differentially when liquid is present in the light path as compared to when liquid is not present in the light path. For these reasons, Applicants respectfully request reconsideration of the rejection of claims 42-44, 47, 48, 51-53, 56, 57, 60 and 61 for anticipation by Hodges *et al.* , and moreover the use of Hodges *et al.* as a basis for the obviousness rejections discussed below.

The Examiner has rejected claim 64 under 35 U.S.C. §103(a) for obviousness over Hodges *et al.* The Examiner asserts that the claim differs from what is disclosed in Hodges *et al.* by calling for retrofitting electrochemical cell with the light source in the optical detector. In response, as discussed above, Hodges *et al.* does not teach or suggest use of differential refraction to detect liquids, or lack thereof, in electrochemical cells, especially in cells of the type claimed in the present application. For this reason, Applicants respectfully request reconsideration of this rejection.

The Examiner has rejected claims 45, 46, 54, 55, 62 and 63 under 35 U.S.C. §103(a) for obviousness over Hodges *et al.* in view of United States Patent No. 5,126,035 (Kieselee *et al.*). Specifically, the Examiner asserts that Kieselee *et al.* discloses an electrochemical oxygen sensor with a cylindrical shape and electrodes adjacent to the end portions of the cylinder, and therefore, it would have been obvious to adapt the optical detection means of Hodges *et al.* to the Kieselee *et al.* sensor so as to ascertain the condition of the sensor. In response, neither Hodges *et al.* nor Kieselee *et al.* describes the use of differential refraction to ascertain the condition of the

described sensor in the electrochemical cells claimed in the present application. For this reason, Applicants respectfully request reconsideration of the rejection of claims 45, 46, 54, 55, 62 and 63 for obviousness over Hodges *et al.* in view of Kiesele *et al.*

The Examiner has rejected claims 49 and 58 under 35 U.S.C. §103(a) for obviousness over Hodges *et al.* in view of United States Patent No. 5,237,855 ("Gates") or Japanese Patent No. 4-167087. The Examiner asserts that it would have been obvious for Hodges *et al.* to adopt more than one optical detector in view of the secondary references so as to detect both the direct path and the refracted path of a light beam. In response, Hodges *et al.* does not teach or suggest use of differential refraction to ascertain the condition of a sensor in an electrochemical cell, and certainly not in a cell of the type claimed in the present application. Gates describes only a tank for measuring whether an object submerged in that tank is leak-tight. Japan 4-167087 describes a light scattering method by which bubbles can be detected, but does not appear to discuss use of the bubble detection methods in connection with electrochemical cells. Further, no reason is provided to apply that reference to detecting failure of electrochemical cells because no reference of record provides motivation to detect imminent failure of a closed electrochemical cell. JP 4-167087 uses lasers and light detectors to count bubbles. In the context of the present application, counting air bubbles or particulates in a liquid is far from detecting the presence of a gas pocket in a closed electrochemical cell with the goal of predicting failure of the cell, as is claimed in all pending claims in the present application.

The Examiner has rejected claims 50, 59, 65, 66 and 71 under 35 U.S.C. §103(a) for obviousness over Hodges *et al.* in view of Gates. The Examiner also has rejected

claims 67-70 for obviousness over Hodges *et al.* in view of Gates and Kiesele *et al.* For reasons discussed above, Hodges *et al.* does not disclose or suggest detection of a gas pocket in the claimed electrochemical cell by refractive methods as defined in the present application. For this reason, Applicants respectfully request reconsideration of those rejections of claims 50, 59, 65-71.

The Examiner has rejected claims 42-44, 47, 48, 50-53, 56, 57 and 59-71 under 35 U.S.C. §103(a) for obviousness over United States Patent No. 3,410,776 to Krasberg in view of Hodges *et al.* and/or Gates or Japanese Patent No. 58-109875. The Examiner asserts that Krasberg discloses an electrochemical cell essentially as disclosed in the present application and that Applicants' claims differ by calling for an optical detector to detect any gas bubble formation. The Examiner further asserts that Hodges *et al.* or Gates discloses optical detection means for detecting gas bubble presence. Further, Japan 58-109875 also assertedly discloses optical detection means for detecting gas bubbles, including means for detecting the reflection or refraction of light caused by the bubbles. Thus, the Examiner asserts that it would have been obvious for Krasberg to apply optical detectors in view of the secondary references to detect any gas formation in the cell because Krasberg is aware that problems such as gas formation can present and because optical detectors are accurate, inexpensive and easily deployable.

In response, neither Krasberg, nor any of the other cited references, discusses any means or motivation for detecting gas formation in a closed electrochemical cell as is claimed. The Krasberg reference indeed does mention bubble formation as a problem and provides a solution for the problem of gas bubble formation in an

electrochemical cell that undergoes extreme pressure changes, such as in a diving apparatus. Nowhere in Krasberg or in any other reference of record in the present application is mentioned: 1) a desire to monitor formation of gas pockets in a closed electrochemical cell, 2) the need for such monitoring, 3) a device for monitoring the electrochemical cell for the presence of gas pockets, 4) the locating of a sensor in an electrochemical cell to predict imminent failure of the cell or 5) the problem of gas bubble formation in electrochemical cells other than those that undergo extreme pressure variations.

It does not follow, simply because Krasberg teaches the problem of gas formation in an oxygen sensor for use in diving equipment and a method for preventing such gas formation, that the detection of gas formation would be desirable in that or other situations. Krasberg certainly does not offer a solution for the detection of gas formation in the electrochemical cell. If Krasberg were to put a warning system in their underwater breathing device to inform a diver of impending failure of the oxygen sensor, Krasberg likely would have received a patent on that invention because there is no teaching or motivation in Krasberg to include such a sensor. The extrapolation made by the Examiner, namely to apply the teachings of Krasberg to the present application, is unwarranted. It is unobvious to test for imminent failure of the presently claimed electrochemical cells inasmuch as it is unobvious to do so in the Krasberg device. No reference of record indicates that it would be desirable to monitor formation of a gas pocket in an electrochemical cell to predict imminent failure of that electrochemical cell.

The Examiner asserts: "since Krasberg teaches the problem of gas formation, it would have been readily obvious to one or more skilled in the art to devise a means for

detecting such gas formation.” This raises the question of where in Krasberg, or in any of the cited references, there is motivation to predict imminent failure by detecting the formation of gas in the device. To formulate a *prima facie* case for obviousness under 35 U.S.C. §103, as stated in MPEP §2142, there must be some suggestion or motivation either in references themselves or in the knowledge generally available to one or more skilled in the art to modify the reference or to combine reference teachings. MPEP §2143.01. Here, there is no motivation provided to modify or combine references to test for imminent failure of the Krasberg device. No reference of record discloses a motivation for detecting imminent failure of an electrochemical cell or the desirability of detecting imminent failure of such an electrochemical cell. Further, the Examiner has not taken official notice of alleged “common knowledge” among those of skill in every art that in any factual scenario involving failure of a device or system, it would be obvious to devise a system for detecting imminent failure of that device or system. Such official notice is not possible without thoroughly undermining the fact-specific obviousness inquiry.

To formulate a *prima facie* case for obviousness, the Examiner also must cite a prior art reference (or references when combined) that teach or suggest all the claim limitations. MPEP 2142. In the present case, the prior art does not teach or suggest placement of the light beam in relationship with the electrodes in the electrochemical cell in the claimed configuration to predict imminent failure of the cell.

Because there is no motivation to modify the device of Krasberg to monitor the status of the cell described therein, no teaching or suggestion to configure the claimed apparatus to detect imminent failure of the cell, and no description in the art of the

desirability of detecting imminent failure of such a cell, Applicants believe that the Examiner has not met the burden of making a *prima facie* case for obviousness and respectfully request reconsideration of the rejection of claims 42-44, 47, 48, 50-53, 56, 57 and 59-71 for obviousness over Krasberg in view of Hodges *et al.* and/or Gates or Japan 58109875.

As a final matter, the Examiner appears to be using impermissible hindsight to fashion the rejections set forth in the Action. In the §102 and §103 rejections presented in the Action, the Examiner characterizes a system that measures O.D. and a different refractive system as both being able to detect a “different property,” rather than compare the actual features the embodiments of Hodges *et al.* to what is claimed. Such characterization is a dangerous stretch of the requirements of 35 U.S.C. 102. For example, the Examiner’s characterization of §102 would mean that, irrespective of structure, different optical devices would be unpatentable over each other because they all accomplish the same goal of magnification.

The device and methods claimed in the present application are different from the device and methods described in Hodges *et al.*, and that is the end of the legal anticipation inquiry. As such, the Examiner’s characterization of O.D. methods and refractive methods as “different properties” of a light beam is simply an attempt, in the face of the disclosure of a novel invention, to justify a novelty rejection over non-anticipatory prior art. The Examiner uses a characteristic disclosed in the present application – a method of detecting the presence of a liquid in a container other than the O.D. method – to form the generic “different properties” generalization. This is use of

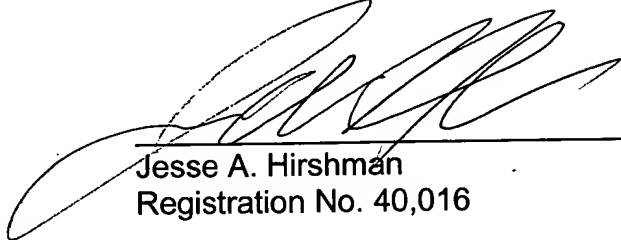


"knowledge gleaned only from applicant's disclosure," and therefore is impermissible hindsight reconstruction. MPEP §2145(X)(A).

Similarly, in formulating the obviousness rejection over Krasberg, the Examiner supplies a motivation not disclosed in the prior art of record, but created with the knowledge presented in the disclosure of the present application. Applicants acknowledge that motivation can be provided from "knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made." Id. However, as with the 102(e) rejection based on Hodges *et al.*, the Examiner points to no reference providing such motivation, only the unsupported generalizations that in knowing of the problem of gas formation, it would have been readily obvious to one of ordinary skill in the art to devise a means to detect such gas formation. Gas sensors have been in existence since well before Krasberg's issuance date (1968), yet the Examiner has provided no evidence of motivation to sense imminent failure of such a sensor. Fitting closed electrochemical cells with a failure prediction apparatus is a good idea, and for this reason Applicants filed the present application. Nevertheless, if it were so obvious and desirable, why then is there no anticipatory reference? In this case, the Examiner, faced with the disclosure in the present application of a solution to a difficult problem, has made an improper legal and logical leap by attempting to fashion a motivation by generalizing rather than by formulating a complete *prima facie* case for obviousness. This form of hindsight reconstruction is impermissible.

For reasons set forth above, Applicants believe claims 42-70 and 72-75, as amended herein, define over the prior art of record and are in proper form for allowance. Applicants respectfully request allowance of claims 42-70 and 72-75.

Respectfully submitted,



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